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PROCEEDINGS

OF

THE ROYAL IRISH ACADEMY.

1838. No. 11.

April 9.

SIR Wm. R. HAMILTON, A. M., President, in the Chair.

The following gentlemen were elected members of the Academy.

Simeon Hardy, Esq., Robert Adams, Esq., Captain John Pitt Kennedy, George Digges Latouche, Esq., Jacob Owens, Esq., Charles T. Webber, Esq., Henry Barry, Esq., The Hon. James King, Elliot Warburton, Esq., George Downes, Esq., The Venerable the Archdeacon of Raphoe.

Sir William Betham read a letter from Dr. Hibbert Ware, describing a cromlech near Bombay, in India. The following are extracts :—

"My chief motive for sending you two sketches of cromlechs, recently discovered by my son, Mr. William Hibbert Ware, Assistant Surgeon, 2nd Foot, or Queen's Royal, in the East Indies, has a reference as much to the interest which such a distant locality attaches to this very early species of monument, as to the apparent use to which it is alleged to have been subservient.

"In the admirable history of Ireland by Mr. Thomas Moore, this interesting writer, while treating of cromlechs, has adverted to the remarkable circumstance recorded in Maundrel's Travels, that a monument of this description was found situated upon the Syrian coast, in the very region of the Phœnicians themselves. He also alludes to the cromlechs which are affirmed, on the authority of Sir Richard Colt Hoare, to have been discovered so far east as Malabar. I have not the means at present of consulting this last mentioned author's History of Ancient Wiltshire, where the account appears, but, happily, the drawings are copied into the work of your late friend Mr. Godfrey Higgins, in his 'Celtic Druids,' who states, that 'it is remarkable Sir Richard Hoare did not accompany the sketches with any observations;' but he properly adds, that 'this author's character is too well known to admit a suspicion of their genuineness. To this remark I heartily subscribe, and if any doubt could ever have existed on the subject, (of which I am not aware,) it must be removed by the communication which I now send you, being an extract of a letter, with drawings, from my son, Mr. William Hibbert Ware, relative to cromlechs discovered by him near Belgaum. The information is to the following effect:

"'I enclose you two sketches of remains which very much resemble the cromlech of Kits Coty House in Kent. These I accidentally stumbled upon in the course of a tiger hunt. Into the composition of each of these monuments four stones enter, which incline towards one another, and are surmounted by one large horizontal stone. From an inquiry of the natives, including information which I received upon the spot, I learn that these remains are tombs of ancient date; and hence, from analogy, equally reasonable with a supposition entertained on the round towers of Ireland, it is probable that such piles in England were erected more as sepulchral stones than for other uses. It is affirmed, that the present structures were never raised for religious purposes. The height of the pile, shewn in sketch fig. 1, is eight feet, the other dimensions being proportionally represented; and this estimation applies also to sketch fig. 2. Their composition is greenstone.'

I.

II.

" Such is the information I have received relative to this very remote locality assignable to the cromlech. Into any theory of European and oriental intercourse which the fact may suggest, I have no wish at present to enter.

" It is remarkable that the accounts given of these Indian monuments, tend to a conclusion similar to that which is derived from the information you were so kind as to send me, relative to a cromlech being found within a sepulchral cairn at Phœnix Park, namely, that it was used for purposes of interment. But the question is, if such a conclusion admit of an universal application? The cromlech has been found in the north of Europe, placed on the very summit of a sepulchral cairn, as Sjöborg, in his systematic work, has pointed out, and in this case, it appears more like an occasional appendix to the cairn, destined, from its peculiar structure, to the celebration of sacrifices in honour of the dead. I am satisfied however, that the cromlech originally subsisted most frequently independently of any cairn whatever; and if, in this isolated state, human ashes have occasionally been discovered in connexion with it, other instances might be cited, in which very careful excavations have not afforded any evidence that this monument had a sepulchral use. A safer conclusion, therefore, remains, that the cromlech was most frequently connected with purposes of interment, although not necessarily so; and that in general it was raised for sacrificial objects."

Dr. Kane read a paper on the sulphates and nitrates of mercury, particularly the basic salts formed by ammonia.

In a former paper Dr. Kane had shewn, that by the action of ammonia on the chlorides of mercury, there were generated compounds involving the radical NH_2, (amidogen,) and the design of the present paper was to develope the function of the ammoniacal element of the oxygen salts of that metal. It was found, however, that from the diversity of the results of former chemists regarding the common basic salts of mercury, it became necessary to re-examine them in order to establish some fixed points to which the constitution of the ammoniacal bodies might be referred.

Among the numerous formulæ which have been assigned to Turbith mineral, Dr. Kane has found $Hg\,O, SO_3 + 2Hg\,O$

to be correct, ($Hg = 101{,}4$,) and there is no other subsulphate; the pure turbith, no matter how prepared, possessing that constitution. By the action of ammonia on persulphate, or on turbith mineral, there is generated a white powder, which was submitted to most careful analysis, and gave the formula $HgO.SO_3 + 2HgO + Hg.NH_2$. was found. The proof that the fourth atom of mercury in this body is not an oxide, is full and positive, and hence Dr. Kane no longer retains the parallelism of theories used in his former memoir, as the absence of oxygen may now be considered as fully proved.

The crystallizable nitrate of the red oxide of mercury has been found $NO_5 + 2HgO + 2HO$, as the younger Mitscherslich had stated; and Dr. Kane shows that there are two basic pernitrates, of which the one, yellow, is similar in composition to the basic nitrates of copper and bismuth, that is, $HO.NO_5 + 3HgO$, and the second, of a brick red colour, he is disposed to consider as $NO_5 + 6HgO$, though it was found exceedingly difficult to decide whether the compound did not retain a trace of water.

It is known that for the composition of the white precipitate, which is given by ammonia with pernitrate of mercury, different results had been obtained by Mitscherslich and Soubeiran. These discrepancies have been reconciled by the discovery that there are at least two, perhaps three precipitates, almost identical in colour and properties, produced in this reaction, but which differ remarkably in their chemical constitution. When the solutions are cold, and the ammonia not in excess, the white precipitate has the composition $NH_3.NO_5 + 3HgO$, the formula obtained by George Mitscherslich, but if the liquor be warmed, it becomes $Hg.O.NO_5 + 2HgO + HgNH_2$. This modification is evidently that which was analyzed by Soubeiran, for he found one atom of acid, one of ammonia, and four of mercury, which ratio is quite true. It will be at once seen that the former body corresponds to the yellow basic nitrate, the oxide of hydrogen being replaced by the amide of hydrogen. Thus

$$\mathrm{NH_3} \quad = \mathrm{NH_2.H} = \mathrm{A}d\mathrm{H}.$$
$$\mathrm{HO.NO_5} + 3\mathrm{H}g\mathrm{O}.$$
$$\mathrm{HA}d.\mathrm{NO_5} + 3\mathrm{H}g\mathrm{O}.$$

This view is remarkably corroborated by the fact, that when a solution of nitrate of ammonia is poured on the yellow basic nitrate, the white powder is formed, while nitric acid is set free. Another remarkable case of combination is shewn by comparing the powder formed by boiling the white precipitate with two of those described in this paper. Thus there are

$$\mathrm{H}g.cl \quad + 2\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{A}d.$$
$$\mathrm{H}g.\mathrm{SO_4} + 2\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{A}d.$$
$$\mathrm{H}g.\mathrm{NO_6} + 2\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{A}d.$$

To which may be added, the oxychloride

$$\mathrm{H}g.cl \quad + 2\,\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{O}.$$

When the white ammonia subnitrate is boiled with solution of ammonia, it dissolves, and a crystalline substance is deposited of a very interesting nature. Its formula, by analysis, is

$$3\,(\mathrm{NH_4O.NO_5}) + 4\mathrm{H}g\mathrm{O},$$

But the circumstances under which it is formed rather indicate for its rational formula the following:

$$(\mathrm{H}g\mathrm{NO_6} + 2\,\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{A}d) + 2\,(\mathrm{NH_4O.NO_5}) + 2\,\mathrm{HO}.$$

George Mitscherslich had already obtained a compound of a similar nature, being

$$\mathrm{NH_3NO_5} + 2\,\mathrm{H}g\mathrm{O} = (\mathrm{H}g\mathrm{NO_6} + 2\,\mathrm{H}g\mathrm{O} + \mathrm{H}g\mathrm{A}d) + \mathrm{NH_4O.NO_5}.$$

Passing to the nitrates of the black oxide of mercury, Professor Kane has verified the analysis of George Mitscherslich, of the two crystallized protonitrates; he then shews that there exists one definite subnitrate of the black oxide, the yellow powder analyzed by Grouvelle. Dr. Kane finds that this powder always retains an equivalent of water, that its formula is $HO.NO_5 + 2\,Hg_2.O$, and that the grey subnitrates which have heen noticed by some chemists, are impure mixtures of black oxide and the yellow powder. Dr. Kane considers the nitrates of the black oxide of mercury to be thus related:

First crystallized, $= Hg_2.O.NO_5 + 2HO$.
Yellow powder, $= HO.NO_5 + 2Hg._2.O$.

Second crystallized, $= 2\,NO_5 + 3\,Hg._2.O + 3HO$. A double salt.

Great difficulty was found in determining what specimen of Hahneman's mercury should be considered as pure and fit for analysis. Considering that the most important sources of error tend to throw the value of mercury too high, Dr. Kane derives his formula from the lowest number which he obtained by analysis, and these numbers were given always by the blackest and purest looking portions. He finds, on these grounds, for the ammonia subnitrate of the black oxide, the formula $NH_3.NO_5 + 2\,Hg._2.O$. which is related to the water subnitrate in a similar manner to what holds in the corresponding compounds of the red oxide.

Thus, in this paper, two propositions are developed: 1st. Increased evidence of the formation of metallic amides. 2nd. That ammonia as amide of hydrogen is capable of replacing oxide of hydrogen in its various functions in the quicksilver salts.

Professor Apjohn read a paper "on the Properties of a new Voltaic Combination," by Thomas Andrews M.D., Professor of Chemistry in the Belfast Institution.

The object of the author in this paper is to extend the results which he has already obtained on the influence of voltaic circles upon the solution of the metals in nitric acid to the case of concentrated sulphuric acid. When a plate of zinc is heated to the temperature of 240° cent. in sulphuric acid, of the sp. gr. 1.847, it is dissolved with the rapid disengagement of a mixture of hydrogen and sulphurous acid gas; but when a similar plate, voltaically associated with a platina wire, is introduced into the same acid, its rate of solution is reduced to one-third of the other, no gas appears at the zinc, and sulphurous acid, almost perfectly pure, separates at the platina wire. Similar effects occur at other temperatures, but the proportion between the quantity of zinc dissolved when alone, and when connected with platina, varies with the temperature. A minute investigation is given of the effect of the distance between the metallic surfaces, and of their relative extent upon the solution of the zinc, and the development of the electrical current; from which it appears that, as in common cases, the action on the zinc was increased by diminishing the distance between the zinc and platina in the liquid, but on the contrary, was diminished by increasing the extent of the platina surface. The latter anomalous result is carefully examined and explained.

The influence of the contact of platina with the other metals, resembles, in general, its effect upon zinc, except in the cases of mercury and arsenic, in which the solution does not appear to be retarded in this way, nor is there almost any gas evolved from the platina.

The general conclusion drawn by the author from all his experiments is, that the formation of a voltaic circle generally diminishes, and never increases chemical action, when the liquid conductor is an oxy-acid of such a strength, that the electro-positive metal is oxidized from the decompositions, not of the water, but of the acid itself.

Professor Mac Cullagh exhibited and described a new optical instrument, intended chiefly for the purpose of making experiments on the light reflected by metals. The instrument consists of two hollow arms or tubes, moveable about the centre, and in the plane, of a large divided circle, each arm being provided with a Nicol's eye-piece, or some equivalent contrivance for polarizing light in a single plane; while in one arm, which is of course crooked, a Fresnel's rhomb is interposed between the eye-piece and the centre of the circle. At this centre is placed a stage for carrying the reflector, with its plane perpendicular to the plane of the circle, and having a motion to and fro for adjustment. Each eye-piece, as well as the Fresnel's rhomb, turns freely about the axis of the arm to which it belongs, and is provided with a small circle for measuring its angle of rotation. When the two arms are set at equal angles with the reflector, and the observer looks through the crooked arm, he will see a light admitted through the straight one; and then, by turning the Fresnel's rhomb, and the eye-piece next his eye, he will be able, by means of their combined movements, to find a position in which the light will entirely disappear. An observation will then have been made; for the light, before its incidence on the metal, is polarized in a given plane by the first eye-piece; but after reflexion from the metal, (as we know from Sir David Brewster's experiments,) it is elliptically polarized; and our object is to determine the *position* and *species* of the little ellipse in which the reflected vibration is supposed to be performed. Now, the axes of this ellipse are parallel and perpendicular to the principal plane of the rhomb, when it is in the situation above described, where the light completely disappears; and the ratio of the axes is the tangent of the angle which that plane makes with the principal section of the eye-piece next the eye. The angles are read off from the divided circles; and thus, for any angle of incidence, and any plane of primitive polarization, we can at once ascertain the nature of the reflected elliptic vibration. Professor Mac Cullagh mentioned, that the instrument was made last year with the view of testing certain formulæ which he has proposed for the case of metallic reflexion, and which have been printed in vol. xviii. pp. 70, 71, of the Transactions of the Academy; but that he had not yet found leisure to make the various adjustments which are necessary in order to obtain satisfactory results with it. The instrument is beautifully executed by Mr. Grubb, who himself contrived the subordinate mechanism, by which the requisite movements are effected with perfect ease to the observer.

The President read the first part of a paper by the Rev. Dr. Hincks, on the Years and Cycles of the ancient Egyptians.

The author's object in this paper is to oppose the received opinion, that the Egyptian year originally consisted of 360 days, and that at some epoch, on which learned men are not agreed, five additional days were annexed to it, in order to approximate more closely to the length of a solar revolution. His own opinion is contained in the five following propositions, which it is the business of his paper to establish.

1st. In the early part of the eighteenth century, before the christian era, there occurred a marked chronological epoch in Egypt.

2nd. Before this epoch the Egyptians used a year, of which the commencement took place at a fixed season, and the average length of which was consequently equal to the tropical year; while after this epoch, they used the wandering year of 365 days.

3rd. Between this chronological epoch, and the year of our Lord, 34, there elapsed six cycles of some sort or other.

4th. The nature of these cycles was such, that in one of them, the astronomical phenomenon which marked the commencement of the old fixed year, travelled forward through a fifth part of the wandering year, or 73 days; and consequently, that in five such cycles, that phenomenon returned again to the commencement of the wandering year, having taken place on every day of it.

5th. The length of each of the smaller cycles was 300 years, consequently the epoch, when the wandering year was introduced was 1767, B. C.; and the first day of the first year was the 8th of November in that year, according to the proleptic Julian reckoning.

Of the truth of the first two of these propositions, the author stated that he had long been convinced; the last three were the result of an investigation recently suggested to him by a reference to a passage in Tacitus, quoted in an article on the pyramids, in Fraser's Magazine for November, 1837.

RESOLVED,—That the thanks of the Academy be given to His Excellency, the Lord Lieutenant, for his kindness in forwarding the work of M. De Jonnès to the Academy.

DONATIONS.

Comptes Rendus Hebdomadaires des Séances de l'Academie des Sciences; Premier Semestre, Nos. 9 and 10. Presented by the Institute.

Statistique de la Grande Bretagne et de l'Irlande, avec une Carte, 1837 *et* 1838. Par Alex. Moreau de Jonnès. Presented by the Author, by favour of the Lord Lieutenant.

Proceedings of the Royal Society of London, No. 31. Presented by the Society.

Transactions of the Agricultural and Horticultural Society of India.—1. *Report on the Physical Condition of the Assam Tea Plant, with reference to Geological Structure, Soils, and Climate.* By John M'Cleland Esq., Assistant Surgeon, Bengal Establishment, and Member of the Asiatic and Medical Societies of Calcutta. Presented by the author.